Sustainability & Energy Statement

Havant Thicket Reservoir

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Executive Summary.

This Sustainability and Energy Statement has been prepared by Ruane Construction Design and Consultancy (RCDC) on behalf of Portsmouth Water to support the planning application for the proposed Visitor Centre and associated facilities at Havant Thicket Reservoir. The report outlines the sustainability principles, energy strategy, and low carbon design measures considered for the development, and demonstrates how the proposals align with relevant national policy, local planning policy, and Portsmouth Water's wider Net Zero aspirations.

The proposed development forms part of the wider Havant Thicket Reservoir project and has been designed with a strong emphasis on environmental protection, resource efficiency, and community engagement. The strategy adopts the principles of best practice industry guidance and the Havant energy hierarchy —to minimise operational energy demand, improve energy efficiency, maximise renewable energy generation and utilise low carbon system, and carbon offsetting where required. The project also takes inspiration from the London Plan energy hierarchy and supports long-term building performance monitoring. A fabric-first approach has been adopted through the use of high-performance building fabric, passive design measures, natural ventilation, daylight optimisation, and solar control strategies.

The project targets Operational Net Zero Carbon (NZC_{OP}), in accordance with the planning approach agreed with the Local Planning Authority, with the adopted strategy focusing on NZC_{OP} rather than undertaking a formal BREEAM assessment. Whilst a formal BREEAM assessment is not proposed, the design has been developed in line with the wider sustainability principles promoted by BREEAM, incorporating measures relating to energy efficiency, health and wellbeing, water efficiency, ecology, operational waste, and low carbon design. The design has prioritised reducing operational energy demand through a fabric-first approach, passive design measures, and efficient building services, while the final pathway to achieving NZC_{OP} will continue to be refined as the design progresses.

The proposed energy strategy includes the use of passive measures natural ventilation assisted by Mechanical Ventilation with Heat Recovery (MVHR), daylight optimisation, LED lighting, along with active measures like all-electric building systems supported by heat pump technology, with the preferred heat pump solution currently being evaluated as the design develops. Renewable energy generation forms a key element of the NZC_{OP} strategy, with on-site solar PV provision maximised where practical while balancing operational, ecological, visual, and maintenance considerations. Additional renewable energy opportunities within Portsmouth Water's wider operational estate are also being explored to complement the on-site strategy where appropriate. The final renewable energy approach will continue to be optimised prior to construction, with the design team and Portsmouth water investigating opportunities to maximise solar PV provision with the objective of achieving NZC_{OP}.

The report also sets out the project's embodied carbon strategy, including consideration of low embodied carbon materials, modern methods of construction, offsite manufacturing opportunities, circular economy principles, and the potential reuse of locally sourced materials timber from the reservoir site. The strategy establishes a framework for ongoing whole life carbon assessment and refinement during the subsequent design stages.

A dynamic thermal modelling assessment and parametric analysis have informed the natural ventilation strategy, façade design, and daylight performance of the building. The assessment demonstrates that the proposed approach can support occupant comfort while reducing operational energy demand and overheating risk under future climate scenarios.

The proposed development also includes measures to support sustainable transport and operational performance, including EV charging infrastructure, energy and water monitoring systems, smart controls, rainwater harvesting, and educational building performance displays intended to support visitor engagement and environmental awareness.

The proposed design has been developed in accordance with the relevant requirements of the Building Regulations and current planning policy. Building performance, operational energy demand, and renewable energy generation will continue to be refined during the subsequent design stages as the building services design and energy modelling are further developed.

Overall, the proposed development demonstrates a robust and considered sustainability strategy which responds appropriately to the regulatory requirements, environmental sensitivity of the site while supporting Portsmouth Water's wider sustainability and Net Zero objectives. While elements of the detailed energy strategy remain under development, the project has established a clear framework for reducing operational energy demand, minimising embodied carbon, and achieving Operational Net Zero Carbon through an appropriate combination of energy efficiency measures and renewable energy generation.

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List of Abbreviations.

ASHP – Air Source Heat Pump
AMS – Automatic Metering System
BMS – Building Management System
BREEAM – Building Research Establishment Environmental Assessment Method
BS (EN) – British Standard (European)
CIBSE – Chartered Institution of Building Services Engineers
COP – Coefficient of Performance
DHN - District Heating Networks
DHW – Domestic Hot Water
EC – Embodied Carbon
EER – Energy Efficiency Ratio
ENE – Abbreviation for BREEAM Credits in the Energy Category
EUI – Energy Use Intensity
EV – Electric Vehicle
GHG – Greenhouse Gas
GWP – Global Warming Potential
HEA – Abbreviation for BREEAM Credits in the Health and Wellbeing Category
IESVE - IES Virtual Environment
IT – Information Technology
LED – Light-Emitting Diode
LETI – London Energy Transformation Initiative
LUE - Abbreviation for BREEAM Credits in the Land Use and Ecology Category
LTHW – Low Temperature Hot Water
MAT - Abbreviation for BREEAM Credits in the Material Category
MEP – Mechanical, Electrical, and Plumbing
MVHR – Mechanical Ventilation with Heat Recovery
NCM - National Calculation Methodology
NZC_{OP} – Net Zero Carbon Operational
O&M - Operation and Maintenance
POE - Post Occupancy Evaluation
POL - Abbreviation for BREEAM Credits in the Pollution Category
PV – Photovoltaic
RIBA – Royal Institute of British Architects
SBEM - Simplified Building Energy Modelling
TRY - Test Reference Year
TM52 – CIBSE Technical Memorandum 52
TM54 – CIBSE Technical Memorandum 54
UDI - Useful Daylight Illuminance
UFH – Underfloor Heating
WAT – Abbreviation for BREEAM Credits in the Water Category
WC – Water Closet
WLC – Whole Life Carbon
WSHP - Water Source Heat Pumps
WST - Abbreviation for BREEAM Credits in the Waste Category

1. Introduction.

The Sustainability and Energy Statement has been prepared to support the planning application of the Visitor Centre at the Havant Thicket Reservoir. It has been prepared by Ruane Construction Design and Consultancy (RCDC) on behalf of Portsmouth Water. The report should be read in conjunction with the other drawings and documents submitted along with this report.

The Visitor Centre forms part of the wider Havant Thicket Reservoir Development. The planning approval of the new reservoir was granted in May 2023, which referenced the submission initially dated 3 June 2021. The reservoir will be about one mile (1.6 km) long from east to west and 0.5 miles (0.8 km) wide from north to south. It will be up to 18 metres deep and have embankments on three sides.

The overall design approach for the reservoir prioritises environmental protection and community benefit. The scheme includes:

- A wetland habitat to support threatened bird species and provide areas for endangered bat species to find food,
- A visitor centre with a café and facilities for communities and schools,
- A network of trails and paths for walking, cycling and horse riding, linking to others in the wider area,
- New woodland, hedgerows and wildflower planting,
- A landscaped parking area for vehicles and bicycles.

1.1. The Brief

The proposed Visitor Centre and associated amenities form an important part of the wider scheme. These buildings will provide interpretation of the ecological and environmental features of the site, as well as supporting educational and community activities.

The buildings are intended to encourage visitor engagement with the site and promote awareness of the environmental value of the reservoir and its surrounding habitats. As such, the visitor centre and associated structures represent key elements within the overall proposal. The buildings have therefore ben designed not only to minimise their environmental impact, but also to demonstrate sustainable design principles and promote environmental awareness amongst visitors.

1.2. Site Location and Commentary

The site for Havant Thicket reservoir presents challenges and opportunities in design. The greenfield site promotes the use of minimal impact strategies and solutions which integrate nature. The site benefits from quiet surrounds with good ambient air quality which is ideal for natural ventilation. Care has been taken to minimise the acoustic impact of the Mechanical, Electrical and Public Health (MEP) plant and the light pollution created on the site.

Minimising water usage is a key aspect of the design story for the building, as well as an important aspect of the building's educational purpose. As the development is located on a previously undeveloped greenfield site, achieving water neutrality presents inherent challenges because the proposal introduces a new potable water demand where none previously existed. The design therefore focuses on minimising potable water consumption through efficient fittings, rainwater reuse, and the adoption of a vacuum drainage system. The proposed vacuum drainage system also reduces the risk of uncontrolled wastewater discharge in the event of pipework damage, providing additional environmental protection given the site's proximity to the reservoir.

The phasing of the reservoir construction has been considered in the selection of heating equipment and renewable energy technologies. Opportunities to integrate with, or make use of, infrastructure delivered as part of the wider reservoir project will continue to be explored during subsequent design stages.

In the planning application, Portsmouth water and the design team are committed to provide a scheme with key drivers shown in the figure below.

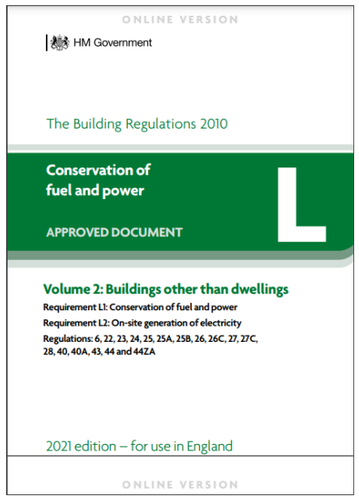
Figure 1-1 Development driver of Havant Thicket Reservoir project

2. Legislation and Regulations.

2.1. Building Regulations

2.1.1. Part L

Part L of the Building Regulations addresses the conservation of fuel and energy. As the scheme is a non-domestic building, Volume 2 of Part L 2021 applies to the site. All the relevant requirements to the project shall be considered and adhered to.



An updated Part L for non-domestic buildings was published in March 2026, which will come into effect in March 2027. This would impact the design of the building and therefore needs to be taken into consideration. The following has been published in terms of when the new regulations come into effect, with the following exceptions:

'a building notice, an initial notice, or an application for building control approval with full plans has been given to the relevant authority in respect of that building before 24 March 2027, provided that the building work to which the notice or application relates is commenced (as defined) on the relevant building before 24 March 2028.'

As the visitor centre is part of a wider project, which has already commenced works, it is anticipated that the current (2021) version of Part L will apply. The design will be reviewed against the applicable version of Part L prior to construction to ensure continued compliance with the Building Regulations in force at that time.

2.1.2. Part F

Part F requires adequate means of ventilation to maintain indoor air quality and prevent condensation. The 2021 revision introduces explicit requirements for monitoring indoor air quality, particularly the use of CO_2 sensors in occupied spaces. Commissioning, Operation and Maintenance (O&M) information, and occupant guidance will be delivered to meet the handover obligations of Part F. Specific flow minimum flow rates provided have also been utilised within the report, alongside all referenced documentation.

2.1.3. Part S

Part S of the Building Regulations addresses the infrastructure of the charging of electric vehicles. It sets requirements of the charging points and cable routes.

2.2. Local Planning Requirements

2.2.1. Havant Borough Local Plan (2014)

The Havant Borough Local Plan (Core Strategy), 2011-2029 (Adopted 2014) establishes the strategic framework for sustainable development within the borough, with a strong emphasis on climate change mitigation, energy efficiency, and environmental protection. The Plan requires new development to minimise energy demand through high standards of building fabric and passive design, consider the integration of renewable and low-carbon energy technologies, and demonstrate resilience to climate change impacts, including flood risk and overheating.

For energy and sustainability purposes, the Local Plan promotes a fabric first approach, efficient building services, water conservation, sustainable drainage systems, and reduced carbon emissions in line with national policy. Development proposals are expected to demonstrate how sustainable design principles have been embedded from the outset and how environmental impacts have been minimised.

2.2.2. Havant Borough Core Strategy

The Havant Borough Council Core Strategy (Local Plan 2011-2029, adopted 2014) provides the strategic planning framework for development within the Borough, with a strong focus on sustainable growth and climate change mitigation. Policy CS1 (Health and Wellbeing) promotes the provision of safe, accessible open spaces and green infrastructure that support community wellbeing. Policy DM8 focuses on the conservation, protection, and enhancement of natural features, habitats, and landscape character. Policy CS14 (Efficient use of resources) encourages resource efficiency, sustainable construction, and reduced environmental impact. Policy CS16 (High-Quality Design) seeks development that achieves good design standards and integrates sustainably within its context. Policy CS18 (Strategic Site Delivery) ensures large -scale developments are delivered with appropriate infrastructure and sustainability considerations. Policy CS21 (Developer requirements) sets out obligations to secure necessary infrastructure, mitigation, and contributions to support sustainable growth.

2.2.3. Havant Climate Change Strategy and Action Plan

The Havant Borough Council Climate Strategy and Action Plan sets clear carbon reduction and net zero targets, aiming for the Council to achieve net zero carbon by 2035 and the Borough to reach net zero by 2045. Interim targets include a 68% reduction in greenhouse gas emissions by 2030 and an ambition to deliver 68.8GWh of total renewable energy generation across the Borough.

The strategy is structured around five key action themes: embedding sustainability through policy and governance framework, raising awareness through education and training, reducing emissions across buildings, transport, and operation, leading by example through council assets and procurement, and supporting wider community climate action.

For new development, the approach follows a clear hierarchy: minimise energy demand through a fabric first approach, maximise energy efficiency, utilise on site-renewable energy and low-carbon system, consider carbon offsetting where required, rely on other energy sources only as last resort. This directly informs the sustainable design requirements for new non-residential buildings.

2.3. BREEAM and Net Zero Comparison

The project has been developed with the objective of achieving Operational Net Zero Carbon (NZC_{OP}) while following the general principles of BREEAM, as agreed with the local authority. The planning condition allows compliance to be demonstrated either through the achievement of NZC_{OP} using fabric first approach, and renewable technologies, or through the achievement of BREEAM Very Good certification. Following discussions with the local authority, it was agreed that the project shall purse the NZC_{OP} route. The design has therefore been developed with the primary objective of achieving NZC_{OP}, while continuing to adopt the relevant sustainability principles promoted by BREEAM.

BREEAM is a holistic tool which lays down principles for a high performing building. A BREEAM 'Very good' rating is awarded to best practice non-domestic buildings with a score of more than 55. The score is based on several environmental criteria including health and wellbeing, energy, water management, and transport.

Whilst the project aligns with several BREEAM principles, it should be noted that achieving a BREEAM 'Very Good' rating does not equate to achieving Net Zero Carbon performance. Industry research published by BRE indicates that a 'Very Good' rated building is typically associated with average CO_2 emission savings of approximately 15%, whereas higher ratings such as 'Excellent' and 'Outstanding' achieve average savings of approximately 32% and 66% respectively. Operational Net Zero Carbon therefore represents a significantly more ambitious and technically demanding target than achieving a BREEAM 'Very Good' certification. The project's primary objective is to minimise operational energy demand and carbon emissions in line with Net Zero Carbon principles, rather than targeting a specific BREEAM certification level.

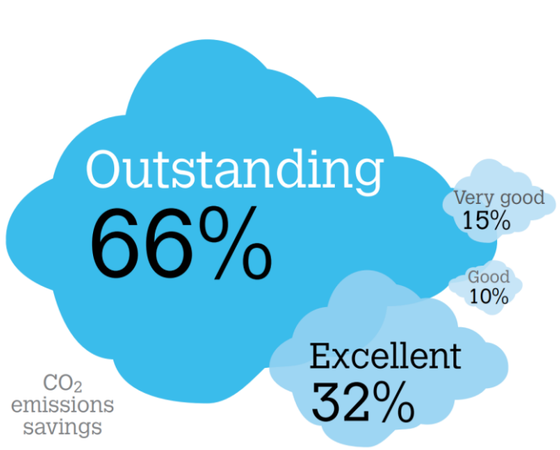


Figure 2-1 Associated CO_2 emissions savings associated with different BREEAM ratings - BRE

For the purpose of reference, BREEAM UK – New Construction (NC), Version 7 was referred to. This is the latest BREEAM Guidance for New Construction and came into effect July 2025.

BREEAM UK NC's 'Very Good' rating requires the mandatory consideration of the following five credits:

- Man 04 Commissioning and handover,
- Hea 04 Indoor air Quality
- Ene 03 Energy Monitoring
- Mat 03 Responsible sourcing of construction products,
- Wat 01 Water consumption.
- Wat 02 Water monitoring.

The Net zero carbon strategies utilised in the project are in line with the sustainability principles of BREEAM, particularly in respects to the credits discussed above. All the above credits have been considered in the design, except 'Man 04' due to the type of procurement process of the project.

The design also aligns with the key principles of the following additional credits.

- Hea 01 Natural Light,
- Hea 02 Artificial light,
- Hea 04 Indoor air quality,
- Hea 05 Thermal comfort,
- Hea 07 Safe and accessible design,
- Ene 01 Energy and carbon performance for regulated energy uses,
- Ene 02 Prediction of operational energy and carbon
- Ene 04 Low Carbon Design,
- Ene 05 Energy efficient equipment,
- Ene 06 Energy efficient systems
- Ene08 Installed controls
- Wat 05 Prediction of operational water consumption
- Mat 04 Durability and resilience
- Mat 05 Material efficiency,
- Wst 03 Operational waste,
- Lue 03 Managing impacts on ecology
- Lue 04 Ecological change and enhancement
- Lue 05 Long term ecological management
- Pol 01 Impact of refrigerants,
- Pol 02 Local air quality.
- Pol04 Reduction of nighttime light pollution

Aligned with the Health and Wellbeing credits, natural daylight has been maximised within the occupied spaces. A parametric daylight study focused on Useful Daylight Illuminance (UDI) has been undertaken to improve daylight performance across the scheme. In line with Hea 02 – Artificial Light, energy efficient LED lighting with daylight sensing and absence detection controls has been considered within the design. Hea 04 – Indoor Air Quality has also been considered using a natural ventilation strategy and the inclusion of CO_2 monitoring within occupied spaces.

In line with Hea 05 – Thermal Comfort, an overheating assessment has been carried out in accordance with CIBSE TM52 methodology. The results of the assessment have informed the opening sizes, opening types, and extent of façade openings within the scheme. Thermal zoning principles have also been considered at this stage and will be further developed during the subsequent design stages. In line with Hea 07 – Safe and Accessible Design, dedicated pedestrian routes and cycle access have been incorporated into the design. Appropriate turning areas and accessible external routes are also proposed as part of the wider landscape strategy. External lighting design, zoning, and controls have been considered to improve safety while reducing unnecessary light spill.

Aligned with Ene 01 – Energy and Carbon Performance, the project aims to minimise operational energy demand and associated carbon emissions through a fabric-first approach supported by energy efficient systems and low carbon technologies. An energy model will be developed to demonstrate compliance with Part L of the Building Regulations and to inform the Energy Performance Ratio (EPR) calculations. In line with Ene 02 – Prediction of Operational Energy and Carbon, high-level operational energy analysis has been undertaken to inform the renewable energy generation strategy and identify opportunities to reduce energy demand.

Low carbon technologies like heat pump have been proposed within the scheme, aligned with Ene 04 – Low Carbon Design and Ene 06 – Energy Efficient Systems. In line with the mandatory Ene 03 – Energy Monitoring credit, an Automatic Metering System (AMS) has been proposed as part of the building services strategy. The system also includes integrated controls for heating, cooling, lighting, and actuated openings to improve operational performance and energy efficiency in line with Ene 08 – Installed Controls.

Low flow fittings and water consumption meters have been proposed within the design to improve water efficiency and reduce potable water consumption. This aligns with the mandatory Wat 01 – Water Consumption and Wat 02 – Water Monitoring credits. In line with Wat 05 – Prediction of Operational Water Consumption, detailed operational water calculations are proposed to be carried out during the subsequent design stages. No specific targets have been identified for the project at this stage. However, the minimum targets set by BREEAM would be used as benchmarks for target setting at the next stages with the intent of maximising water efficiency for the project.

Aligned with Mat 03 – Responsible Sourcing of Construction Products, the project considers the use of modern methods of construction and materials with lower environmental impact. The modular design approach supports reductions in construction waste, embodied carbon, and overall construction impacts. Refrigerants with low Global Warming Potential (GWP) have also been considered within the building services strategy in line with Pol 01 – Impact of Refrigerants.

In line with Wst 03 – Operational Waste, dedicated waste storage areas have been incorporated within the design to support operational recycling and waste segregation.

Given the available landscape area and opportunities for ecological enhancement, the project incorporates several measures to maintain and improve ecological value across the site. The proposals include the planting of native species and the creation of habitat areas around the visitor centre. Further details will be developed as part of the detailed landscape design during later stages. These measures align with Lue 03 – Managing Impacts on Ecology, Lue 04 – Ecological Change and Enhancement, and Lue 05 – Long Term Ecological Management.

The use of energy efficient systems and the proposed landscape strategy contribute towards improving local air quality in line with Pol 02 – Local Air Quality. The external lighting strategy has also been designed to minimise nighttime light pollution through appropriate zoning and lighting controls, aligned with Pol 04 – Reduction of Nighttime Light Pollution.

The project addresses most of the BREEAM credits including the non-mandatory ones. The above discussed are some of the examples considered in the project. This establishes the similarities between the BREEAM approach and the adopted NZC_{OP} approach. Whilst the BREEAM assessment has not been undertaken, the general strategies used in the project are aligned with the BREEAM principles to achieve a high performance and energy efficient building. However, despite the design meeting most of the BREEAM credits, it focuses on achieving NZC_{OP}.

2.4. Wider Planning Application Review

The planning approval of new reservoir was granted in May 2023, which referenced the submission initially dated 3 June 2021. Low carbon design of building developments and renewable energy applications form the solid foundation in the design of Visitor Centre, aligning to the vision of achieving carbon neutral by 2050.

In the planning decision, the proposed design was ruled:

- The development is sustainable, fully maintained, cost-effective and delivers environmental and community benefits,
- The proposal realises the potential for renewable energy while considering nature conservation and other site constraints,
- Opportunities arising from the new pipe works are taken to enhance the habitats, recreation provision and cycle and pedestrian accessibility along the stream corridors,
- The design proposes use of energy efficient lighting to reduce energy requirements of the new developments (visitor centre, car parks), alongside the use of natural material in the visitor centre to improve insulation and thereby the building energy performance,
- Sustainable material procurement and use through the re-use of excavated materials and re-use of timber on site as much as possible,
- Further development during detailed design would explore the use of Sustainable Urban Drainage Systems (SuDS) to provide more green spaces.

In addition, there are reserved matters assigned to Visitor Centre and associated amenities:

- Consideration of the play area location,
- Any non-residential buildings to achieve a reduction in greenhouse gas emissions using 'Fabric First' principles and renewable technology (including solar PV where appropriate), and/or contributing to BREEAM 'Very Good' certification (subsequently BREEAM certification is agreed with the local authority to NOT be pursued, but the design should consider adaptation of relevant strategies),
- Closed Circuit Television (CCTV) cameras linked to a monitoring station to provide for immediate response to incidents as they are occurring,
- Electric Vehicle (EV) parking spaces and charging points,
- Cycle parking (within a covered Sheffield stand).

Figure 2-2: Masterplan of current design of Visitor Centre and associated amenities.

2.5. Project Implications

The following section summarises the implications of the regulations discussed above on the project. The applicable Building Regulations establish the minimum performance standards for the building fabric and building services. The proposed design seeks to exceed these minimum requirements where practicable through the adoption of passive design measures, efficient building services, and renewable energy generation.

Passive strategies should be utilised to achieve an energy efficient building. Renewable energy generation has been incorporated into the design and will continue to be optimised throughout the subsequent design stages to support the project's Operational Net Zero Carbon objective. The project has been developed with the objective of achieving NZC_{OP}, in accordance with the planning approach agreed with the Local Planning Authority.

3. Whole Life Carbon

Whole Life Carbon (WLC) refers to the total greenhouse gas (GHG) emissions and removals associated with an asset over its entire lifecycle—including its production, operation, maintenance, and disposal. This is defined in line with the RICS Whole Life Carbon Assessment for the Built Environment (2024) and incorporates both embodied and operational carbon (Modules A–D). The key definitions have been summarised in appendix A.

Figure 3-1 Whole life carbon definition

The project aims to align with best practice guidance for whole life carbon reduction, referencing industry benchmarks including the RIBA 2030 Climate Challenge and LETI guidance on operational and embodied carbon. Within this context, best practice is generally defined as a building that seeks to minimise embodied carbon while targeting net zero operational carbon through a combination of energy efficiency and renewable energy generation.

3.1. Embodied Carbon

Alongside efforts to minimise operational energy demand, the design process has also considered opportunities to reduce the embodied carbon associated with the development.

As the proposal is for new build development, there is significant opportunity to influence embodied carbon through decisions relating to structural systems, material specifications, and construction methodology. These considerations are intended to be balanced with operational performance to ensure that reductions in one area do not result in unintended increases elsewhere across the building lifecycle.

This approach is aligned with the principles outlines within industry guidance and reflects the intent of the BREEAM credit relating to low carbon design and material efficiency.

3.1.1. Embodied Carbon Design Process

The embodied carbon (EC) design approach has been developed to broadly align with the proposed procurement strategy for the project. At this stage, the procurement route is anticipated to support an offsite construction approach, primarily driven by programme considerations and the potential benefits associated with modular construction methodologies. However, the procurement strategy and associated construction methodology will continue to be developed during the subsequent design stages.

Offsite construction methods have been considered due to their potential to reduce construction-related carbon emissions through improved material efficiency, reduced onsite waste, lower transport impacts, and reduced reliance on temporary onsite facilities. Construction within a controlled factory environment may also provide opportunities for improved build quality and installation efficiencies. These potential benefits have informed the design considerations from an embodied carbon perspective at this stage.

Given the current stage of design and the evolving procurement strategy, several key design decisions, are yet to be confirmed and will be developed further during the next design stages. As a result, it is not currently appropriate to define fixed embodied carbon targets or commit to specific embodied carbon reduction measures. The embodied carbon strategy will therefore continue to be refined as the design, and procurement approach progresses.

The following approach has therefore been developed for minimising the EC within the building.

- A target will be set for the building within the tender documentation. Both a minimal level of performance and an aspirational target are to be provided, and commentary from the Contractor on how achievable this is will be requested within the Tender Questionnaire.
- The tender documentation will also provide a clear requirement for measuring and reporting on EC. This process will follow the RICS requirements set out in the Whole Life Carbon Assessment standards and guidance document. Clear reporting will be requested at construction stages with this report to be included within the O&M package.
    - It is suggested that these reports are reviewed by the design team as part of sign off.
- Regular design review meetings will be set up during the mobilisation and design periods to track progress against the aspirational targets. The aim of the meeting is to retain EC at the forefront of the Contractor and their Design Team. Key topics to be discussed will include the following:
    - Primary structural options,
    - Façade material,
    - Roof design,
    - Floor build ups,
    - Internal walls build ups,
    - Finishes,
    - MEP materiality,
- The updates of this EC meeting will be reported at the monthly project progress meeting and included as a key requirement within the monthly progress report.
- Should residual embodied carbon remain following the implementation of reasonable reduction measures, the project team may consider the role of high-quality carbon removals or offsetting in accordance with the client's wider carbon strategy.
- Through the construction process, any changes to the design are to be captured from an EC perspective.
- The Contractor will also be heavily encouraged to review the carbon emissions associated with the construction process itself. This will be specifically requested within the tender documentation, with clear definitions of what is to be measured. Discussions around the Contractors strategies for measuring and recording this information will be had at an early stage and developed through the design process.
- Once the final stage 6 report is completed, a review workshops are recommended to understand lessons learned from the project.

3.1.2. Design measures

The project adopts a proactive low embodied carbon strategy, focusing on material efficiency, circular economy principles, and construction methods with low life cycle impacts. The strategy aims to reduce emissions across the A1–A5 life cycle stages and beyond, with particular emphasis on:

- Locally sourced materials, minimising emissions from transportation (A2, A4),
- High recycled content products, where technically and visually appropriate,
- Materials with circular end-of-life pathways, including reuse, recycling, or remanufacturing,
- Construction techniques that reduce the need for applied finishes and minimise waste.

Figure 3-2 Oak Timber from the site. Source: Project Scope document for the project

For the Visitor Centre, the design team is exploring the use of locally available oak timber harvested from trees felled during the reservoir construction. This timber is currently stored at WLW Timber and represents a significant opportunity to reduce the building's embodied carbon—particularly in Modules A2 (transport to manufacturer) and A4 (transport to site), where emissions from long-distance transportation are avoided. Utilising this existing resource supports circular economy principles and provides a sustainable, characterful material palette aligned with the site's natural setting.

The Bird Hide is expected to follow a similar approach via low-carbon alternatives such as rammed earth, or mud construction, which offers excellent thermal mass, low environmental impact, and natural integration with the surrounding landscape. Both structures are envisioned to blend into the site's ecological character while minimising their material and carbon footprint.

In addition, the embodied carbon strategy shall include the following measures:

- Favour mono-material elements to enable future disassembly and material recovery,
- Limit the use of high-impact materials such as Portland cement, and substitute with alternative binders and low-carbon concrete mixes,
- Use natural insulation materials (e.g. cellulose, wood fibre) and timber structural elements wherever feasible,
- Use low embodied carbon plasterboard or plasterboard alternatives,
- Incorporate timber-framed windows and low-carbon external wall assemblies,
- Minimise unnecessary finishes, including omitting false ceilings in favour of exposed MEP in corridors and WCs, Use of internal finishes is to be reviewed with these included only where necessary.
- Explore Modern Methods of Construction (MMC) or off-site prefabrication where viable, to reduce on-site waste and improve construction efficiency. This may not be compatible with prioritising local material taken from the wider site. Use of offsite and modular construction processes can improve quality and reduce carbon, whilst also cutting down on the site programme causing less disruption and noise. This is generally hoped to provide reduced carbon when compared to a traditional construction route, with the emissions associated with the build to be carefully measured through the construction process.
- Use of low GWP refrigerants in all cooling and heat pump systems,
- Specification of factory-sealed package heat pumps, eliminating the need for refrigerant handling or charging on-site, and reducing leakage risks and installation-related emissions.

This holistic strategy is intended to support achievement of both the project's embodied carbon targets and broader sustainability outcomes, while demonstrating best-practice alignment with current guidance from LETI, RIBA, RICS and BS EN 15978.

3.2. Operational Carbon

Operational carbon emissions, associated with building use (Modules B6–B7), primarily result from heating, cooling, lighting, and equipment loads. While detailed modelling has not yet been undertaken, the current strategy is informed by building typology, intended spatial functions, and indicative system design. Energy use targets will be defined at the next stage following further design development and energy modelling.

In the absence of a defined benchmark for this specific building typology, the project will reference the principles of the RIBA 2030 Climate Challenge, the Havant and London Plan energy hierarchies — to guide the strategy. Although the project does not under the remit of the London Plan, it has been selected as a benchmark for good within the UK currently. This includes a focus on passive demand reduction, efficient system selection, renewable energy generation, and performance monitoring.

3.2.1. Operational Energy Prediction

Preliminary estimate of annual energy consumption of the site including visitor centre, service building, EV Charging, Bird Hide, and other plant is currently estimated to be approximately 425MWh/year altogether. Estimation is detailed in following tables. The values presented are intended to inform the developing renewable energy strategy and should not be interpreted as final operational energy predictions. Representative Energy Use Intensity (EUI) benchmarks, informed by comparable building typologies and industry guidance, have been adopted at this stage. These shall be updated based on the results from the detailed TM54 calculations, which shall be done at the next stage.

For EV charging, the predicted energy demand is based on the current EV strategy as detailed in section 4.5 of this report. Relevant assumptions have been made around the use of the EV chargers. The calculations could be reviewed at the next stage following the progress of the EV strategy.

Visitor Centre	Area (m^2)	EUI ($kWh/m^2/yr$)	Energy Estimate (kWh/yr)
Entrance Lobby	46	60	2,760
Shop	69	60	4,140
Education/ Community	69	200	13,800
Staff Room	42	60	2,520
Staff Office	11	60	660
Visitor Toilets	42	20	840
Changing Places	12	20	240
Education Spaces Wash	15	20	300
Education Space Store	4	20	80
Stock Room	6	20	120
Cleaners Store	7	20	140
Staff Room Store	2	20	40
Staff WC	5	20	100
Circulation	44	60	2,640
Café/ Servery *(60-200 $kWh/m^2/yr$)*	115	130	14,950
Kitchen	69	1,300	89,700
Preliminary TOTAL			133,030
Safety factor			1.15
OVERALL TOTAL			**152,985**

Services Building	Area m2	EUI ($kWh/m^2/yr$)	Energy Estimate (kWh/yr)
Kiosk + Cold Storage	60	800	48,000
Dry Store, Plant and WCs	120	20	2,400
Car Park	750	10	7,500
Preliminary TOTAL			57,900
Safety factor			1.15
OVERALL TOTAL			**66,585**

Others	Area m2	EUI ($kWh/m^2/yr$)	Energy Estimate (kWh/yr)
EV Charging	N/A	N/A	177,755
Bird Hide	25	10	250
Plant + IT	32	20	640
Preliminary TOTAL			178,645
Safety factor			1.15
OVERALL TOTAL			**205,442**

Based on the current design assumptions, the total anticipated operational energy demand for the development is approximately 425 MWh/year. This estimate will continue to be refined as the design develops and will inform the optimisation of the renewable energy strategy to support the project's Operational Net Zero Carbon objective.

4. Sustainability and Energy Strategy.

The Sustainability and Energy Strategy for the project has been developed in line with the relevant Local Plan policies, the Havant and London Plan energy hierarchy principles, and Portsmouth Water's sustainability aspirations for the development. The strategy adopts a fabric-first and low carbon design approach, with consideration given to operational energy performance, embodied carbon reduction, occupant wellbeing, and long-term environmental performance.

The approach outlined within this section sets out the key sustainability principles considered at this stage of design and identifies opportunities to further develop the strategy during the subsequent design stages.

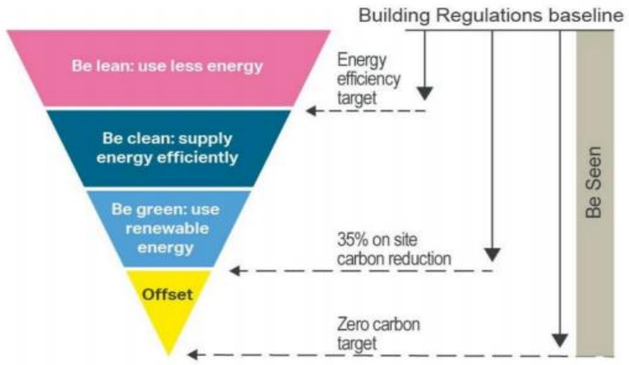


Figure 4-1 Energy hierarchy (taken from London Plan supplementary documentation

4.1. Minimising Energy Demand

In line with Havant's energy hierarchy, the design prioritises a 'Fabric First' approach to reduce energy demand through passive design and high-performance envelope specification. Key measures include:

- Optimised Orientation: The Visitor Centre is oriented southeast to maximise winter solar gain and daylighting while offering views of the reservoir. This supports reduced space heating and lighting loads while enhancing user comfort.
- Thermal Performance: The building incorporates high-performance insulation and exposed thermal mass to reduce heat loss and stabilise internal temperatures through seasonal adaptation. Targeted U-values are:

Table 4-1. Targeted Building Fabric Performance

Proposed Fabric Performance for Visitor Centre	U value ($W/m^2.K$)
External wall	0.15
Roof	0.12
Ground floor	0.12
Doors	1.2
Windows	1.4
Windows – g-value	0.4
Airtightness ($m^3/h.m^2@50Pa$)	3

- Low Carbon Materials: Local, low embodied materials are proposed, with further details provided in the section 3.1.2.
- Solar control: Fixed overhangs and external shading devices shall be included in the design to limit summer solar gain, reduce overheating risk, and mitigate cooling demand.
- Natural ventilation strategy: cross and stack ventilation is enabled in the design via high-level automated openings, supporting passive cooling during shoulder seasons. Secure night ventilation is also planned.

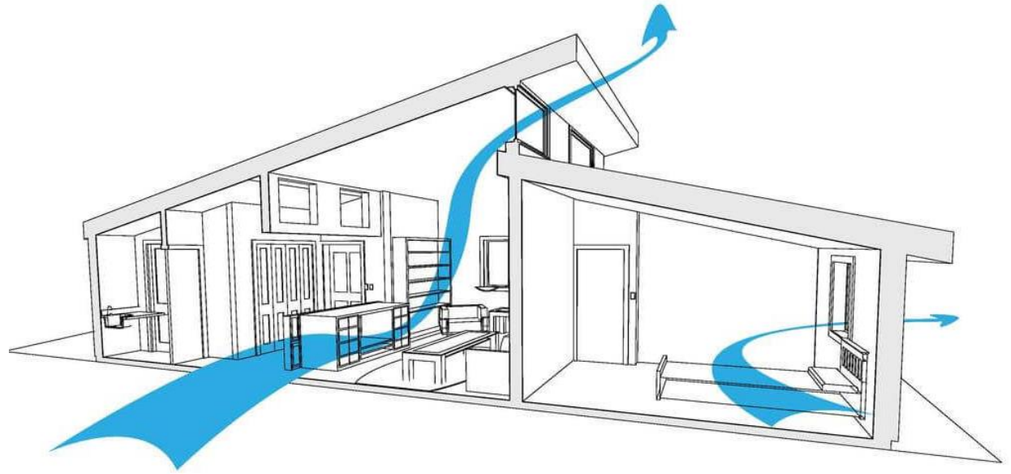


Figure 4-2 Natural ventilation strategy improved with high level opening for enhanced chimney effect

- Daylighting & Visual Comfort: Glazing design shall be optimised to minimise artificial lighting demand. Detailed daylight and glare modelling will be undertaken at the next stage.
- Water consumption reduction: In alignment with the RIBA 2030 Climate challenge, the project targets a consumption of 10 litres per person per day. This shall be achieved by including vacuum toilets in the design.
- Rainwater Harvesting: Rainwater shall be collected and reused for toilet flushing.
- Greywater Recycling: Initially considered, but discounted due to limited and poor-quality greywater from kitchen sources.
- Energy efficient lighting: LED lighting has been proposed all throughout the building.

4.1.1. Parametric Study

Parametric study has been conducted to optimise building performance through data-led design decisions by:

- Reducing annual energy demand (heating, and cooling),
- Maximizing daylight quality and distribution,
- Balancing comfort, energy efficiency, and architectural intent.

Parametric analysis methodology

The study focused on optimisation of windows in café, education, staff and office spaces. The study utilised parameter variables to explore different design options available. These pre-defined parameters act as detectives to connect the dots and identify the trends and performance changes when parameters vary.

Table 4-2 summarizes the various parameters used for the study:

Table 4-2 Summary of Parameters adopted in Parametric Studies.

Parameter	Test range	Purpose
Glazing U-value	1.4 W/m^{2}K (double) / 1.1 W/m^{2}K (triple)	Thermal performance and comfort
Café - Southwest Window Width	5m, 8m, 10m	Daylight penetration vs heat loss
Café - Southeast Window Width	12m, 15m, 20m	
Education – Window Width	4m, 6m	
Staff area – Window Width	2m, 5m	
Office area – Window Width	1m, 3m	
Sill height	0m, 0.5m, 0.8m	View out from the space vs daylight penetration
Overhang depth	0m*, 1.5m, 1.75m, 2.0m	Summer shading vs winter solar access

*Only in cases of education, staff and offices.

The study was undertaken in Rhino + Grasshopper with various environmental analysis plugins.

The various iterations were analysed based on the respective savings on cooling, and heating energy, and Useful Daylight Illuminance (UDI) as compared to the baseline design (Stage 2 architectural design).

Baseline Design Performance

The performance of the baseline design is as described below. The predicted heating and cooling energy for the baseline design for the case study spaces have been summarised in the Table 4-3 below.

Table 4-3 Predicted Heating and cooling energy (baseline).

Space	Cooling Energy (kWh/year)	Heating Energy (kWh/year)
Café	925	3,402
Education	231	1,490
Staff area	7	1,780
Office area	17	645

UDI is the percent of occupied hours where the illuminance falls between minimum and maximum thresholds of 100-2000 lux. This is a useful metric since it maximizes the useful daylight thereby minimizing uncomfortable illuminance levels in the space. The UDI for all the baseline design is as shown in the Figure 4-3.

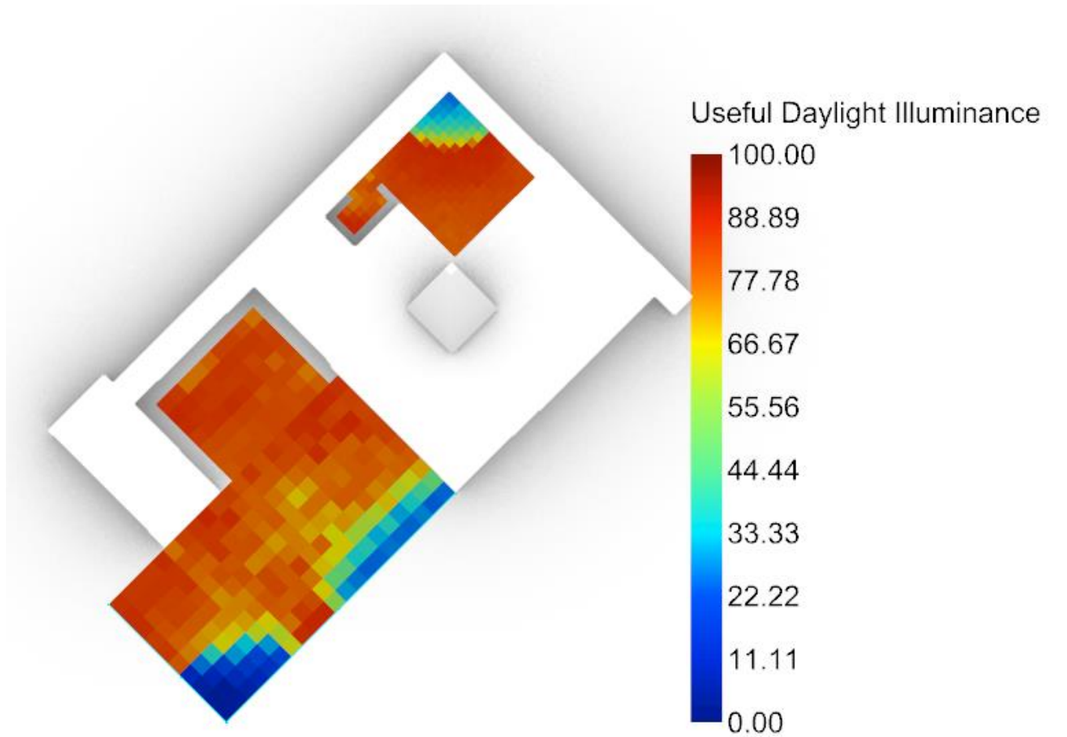


Figure 4-3: Useful Daylight Illuminance (baseline).

Where UDI provided an insight in the overall performance of the space, the next analysis - a point in time analysis highlighted the lux levels at a certain point. This was useful to understand how the spaces shall perform at a given time. Figure 4-4 shows the lux levels in the various spaces at 12pm on 21st June (Summer Solstice).

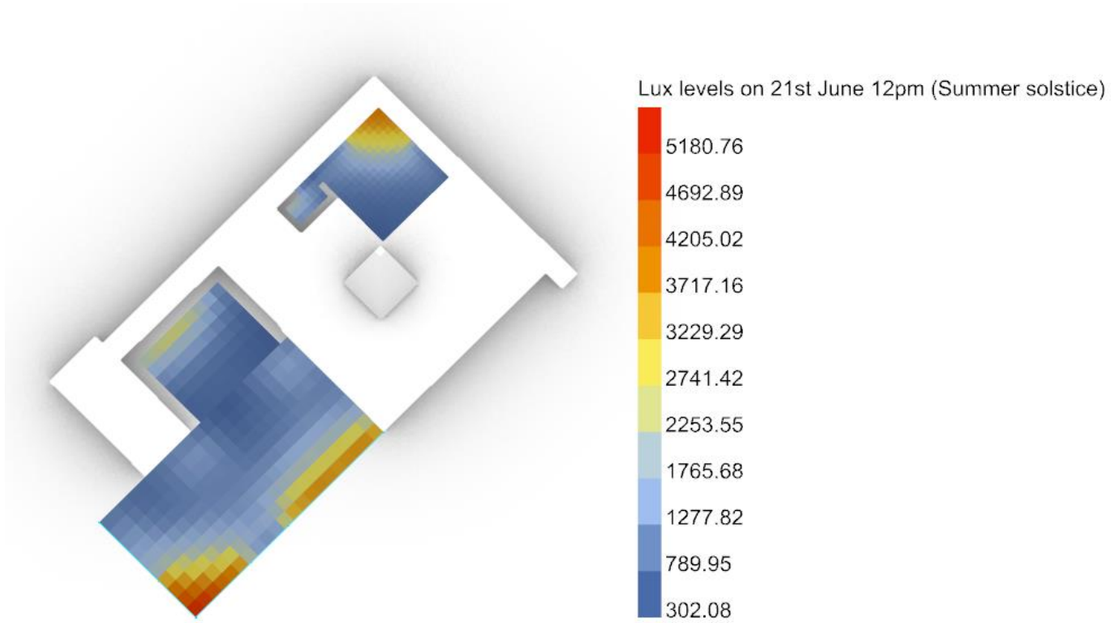


Figure 4-4 Point in Time daylight on 21st June at 12pm (baseline).

Parametric Analysis Results

Following the baseline performance study, using the parameters mentioned above, about 300+ different iterations were developed and analysed. The performance of the various iterations in the parametric analysis when compared to the baseline design highlighted how the design can be optimised.

Based on the analysis the following trends were observed:

- Larger windows on the south-eastern façade (in the café) allow some useful solar gains in winter which can result in reduced heating energy demand in the cafe.
- Larger windows on the northeast side (morning hours) and northwest side (afternoon hours) allow some useful solar gains in early spring and late autumn which can result in reduced heating energy demand in the education, staff, and office.
- Low sill level can be opted for as it allows more useful solar gains, better daylight, and views out of the space.
- Since the energy savings difference due to triple glazing and double glazing isn't huge; it is concluded that a U-value of 1.4W/m^{2}K can be targeted.
- An overhang depth of 1.5m can improve the performance of the spaces.

The following trade-offs were also observed:

Table 4-4 Design Trade-off by fabric elements in different seasons or circumstances.

Adjustment	Benefit	Drawback
High performing glazing	Lower heating load hence lower operational energy cost and carbon emissions. Double glazing a more cost-effective solution.	Potential of increased summer cooling unless shaded and should specify a more stringent g-value
Increased overhang	Reduced summer cooling load	Reduced winter daylight
Low sill height	Better views out Better daylighting	Risk of increased thermal bridging

The parametric study indicates potential for 2.64% energy savings in case of café, and 4.39% energy savings combined in education, staff and office space through targeted façade and glazing adjustments,

4.1.2. Natural Ventilation Strategy

The natural ventilation strategy has been informed based on the following assessment, undertaken for all occupied spaces. The aim was to maintain thermal comfort while maximising the use of natural ventilation throughout the building.

The above-mentioned parametric study defined the size and arrangement of the façade openings. The following study informed the airflow rates required within the spaces to ensure adequate ventilation provision without excessive ventilation rates or unnecessary heat loss. The opening strategy was informed by occupancy patterns, available free area, thermal performance requirements, and the location of openings within each elevation.

Methodology

The assessment has been developed in line with the CIBSE TM52 methodology using dynamic thermal modelling within IESVE software. The thermal IES model was assessed using future weather files, including 2050 and 2080 climate scenarios, to test the robustness of the proposed natural ventilation strategy under future climatic conditions.

The following opening categories were defined within the thermal model:

- High-level windows,
- Eye-level windows,
- Turrets, and
- Glazed doors.

Results and Assumptions

The following opening types were considered within the thermal model as part of the ventilation strategy:

- High-Level Windows
  - Combination of operable and fixed high-level windows.
  - Operable windows assumed to provide approximately 30% openable area.
- Turrets
  - Assumed to be top-hung openings with approximately 75% openable area.
  - Actuated louvers of approx. 0.6m^2 cover the upper portion of the turrets.

- One of the turrets shall accommodate the MVHR exhaust. Details of these openings are under development and shall be refined at the next stages.
- Eye-Level Windows
  - Combination of operable and fixed eye-level windows.
  - Operable windows assumed to be bottom hung with approximately 6.5% effective openable area based on a 100 mm restrictor.
- Glazed Doors
  - Assumed to remain closed for the purposes of the overheating and ventilation assessment.

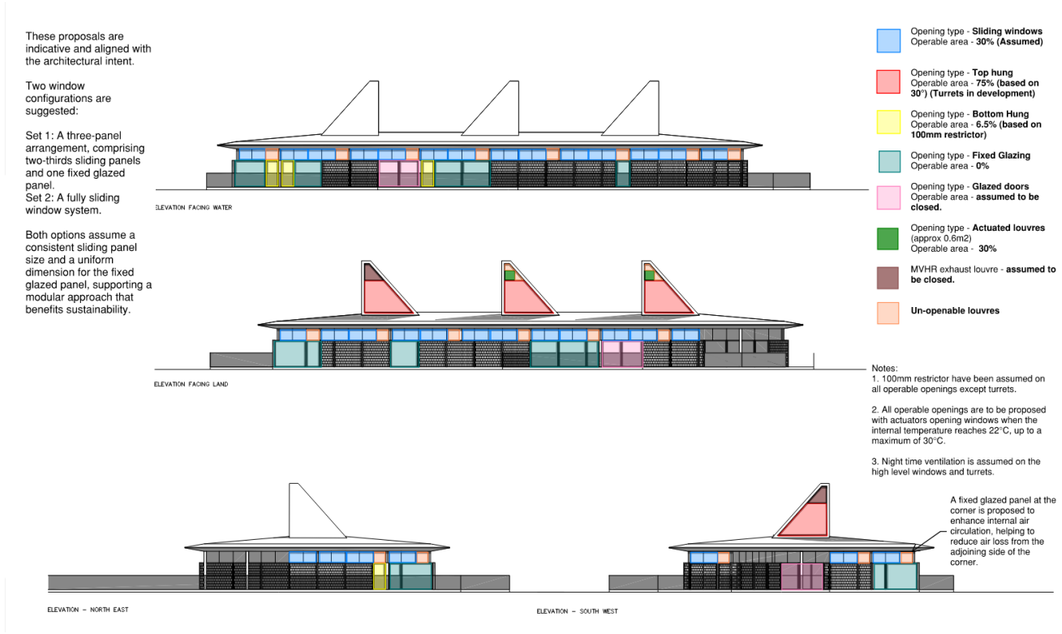


Figure 4-5 Natural Ventilation Strategy

All operable openings are proposed to incorporate actuator-controlled openings linked to the building controls strategy. Within the thermal model, the openings were assumed to begin opening when the internal temperature reaches 22°C, with progressive opening up to a maximum threshold temperature of 30°C.

Night-time ventilation has also been incorporated within the strategy through the operation of selected high-level windows and roof turrets. This allows passive night cooling to reduce internal temperatures and improve thermal comfort during warmer periods.

4.2. Maximising Energy Efficiency

The next step in the energy hierarchy encourages developments to supply energy as efficiently and cleanly as possible, avoiding the use of fossil fuels on site prioritising electrified heat sources, where possible. Efficient systems, which do not use fossil fuels, for heating, cooling, ventilation, and Domestic Hot Water (DHW) are critical to achieving NZC_{OP}.

A range of low-carbon heating technologies were evaluated:

- Air Source Heat Pumps (ASHP)
- Water Source Heat Pumps (WSHP)
- Ground Source Heat pump (GSHP)

Several alternative technologies have also been considered but are not currently proposed:

- Solar thermal system was considered to serve the DHW requirements but deprioritised due to low requirements in the building.
- Two District Heating Networks (DHN) were identified nearby (one under construction, one approved) as shown in the Figure 4-6. However, both were considered too distant for viable connection, based on UK Heat Networks Planning Database analysis. The proposed systems are compatible with a future DHN.

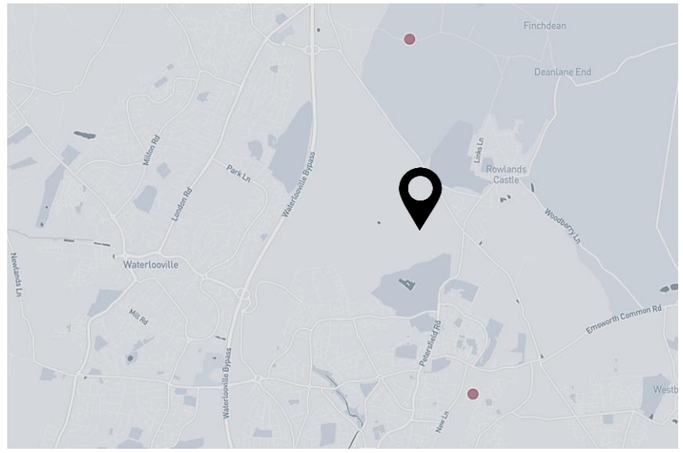


Figure 4-6 Potential DHN networks in proximity to the site

The proposed development will adopt an all-electric building services strategy, with heat pump technology proposed to serve the space heating, cooling, and DHW requirements. This removes the need for on-site fossil fuel combustion and supports the long-term decarbonisation of the building as the UK electricity grid continues to reduce in carbon intensity.

Natural ventilation will be supported by Mechanical Ventilation with Heat Recovery (MVHR) units to improve indoor air quality while reducing ventilation heat losses.

The preferred heat pump solution has not yet been finalised. Air Source Heat Pumps, Water Source Heat Pumps, and Ground Source Heat Pumps are currently being evaluated to determine the most appropriate solution for the development. The final selection will consider operational efficiency, ease of maintenance, capital cost, procurement, constructability, whole-life carbon, operational carbon, and the opportunities and constraints associated with the wider reservoir development. It shall also consider the operational phasing of the wider Havant Thicket Reservoir development. Although Water Source Heat Pumps present a significant long-term opportunity, the Visitor Centre is expected to become operational before the reservoir reaches its final operating condition. The suitability of the reservoir as a heat source during the initial operational period will therefore be assessed as the design develops, alongside consideration of temporary or phased solutions where appropriate.

Each option presents different advantages. Air Source Heat Pumps represent a simple and well-established solution. Water Source Heat Pumps provide the opportunity to utilise the adjacent reservoir as a low-temperature heat source, subject to appropriate environmental safeguards and operational considerations. Ground Source Heat Pumps may provide high seasonal efficiencies but require more extensive installation

infrastructure. These options will continue to be assessed during the subsequent design stages before the preferred solution is confirmed.

The detailed building services strategy, including the preferred heat pump technology and associated system efficiencies, will continue to be developed during the subsequent design stages to support the project's objective of achieving Operational Net Zero Carbon.

4.3. On-site Renewable Energy

This element focuses on maximising on-site renewable energy generation in accordance with the Havant energy hierarchy. Following the implementation of passive design measures and energy-efficient building services, renewable energy generation forms a key part of the strategy to further reduce operational carbon emissions and support the project's objective of achieving NZC_{OP}.

Several technologies were explored:

- Solar PV systems were considered which is considered to be the most viable renewable technology in the UK. Rooftop solar PVs over Visitor Centre were initially considered but ultimately deemed impractical. This was primarily since the PV would expose maintenance works at height and are prone to fall accident to the proximity of water body.
- Car mounted PV structures (Carport PVs) were also considered. The total area coverage over parking lots, excluding vehicle circulation is about 3,000m^2 which could generate roughly 600MWh annually. This is roughly 273% of annual energy consumption of the Visitor Centre and Service building combined, leaving a significant surplus of power generated for other purposes at the reservoir development, perhaps the pumping power required for the reservoir operation. This is currently considered the preferred option, with the final installed capacity to be confirmed during the subsequent design stages.
- Floating PV arrays within the reservoir were considered in the early design stages, with an indicative provision of about 1,100m^2 of floating PV panels. A key advantage of this approach is the relatively stable background temperature of the water body, which can reduce the thermal losses and improve generation efficiency. The estimated annual electricity generation from this system was approximately 220MWh annually, which would have been sufficient to enable the site to achieve Net Zero Operational performance through onsite generation alone. However, the proposal was discounted due to the following reasons:
    - Public safety risks, including potential for unauthorised access to the water body,
    - Increased operational and maintenance complexities.
- Small scale wind turbines were reviewed due to the open character of the reservoir and surrounding landscape. They were also favoured since they presented the opportunity to create awareness about energy efficient technologies among the visitors. However, they were discounted due to:
    - Relatively low and inconsistent energy yield at the scale appropriate for the site following the 'square-cube law' which states that a wind turbine's energy output increases by the square of its rotor diameter. This would mean that wind turbines of considerable size would be required to meet the energy demand of the site.
    - Significant visual and landscape impact in a sensitive recreational and ecological setting,
    - Large spatial requirements and associated infrastructure,
    - Associated risks to the birds and other wildlife in the area.
- Piezoelectric generator – Pressure-impact generation commonly activated by stepping. These were considered since it offers strong educational and engagement potential. The design included a dedicated walkway for visitors with the provision for visitors to observe their energy contributions in real time. However, these were also discounted due to the low energy generation.

The figure below shows the earlier design which considered the floating PVs, car port PVs, and wind turbines.

Figure 4-7 Renewable Strategy (earlier design)

The proposed renewable energy strategy seeks to maximise practical on-site solar PV generation while balancing operational performance, public safety, ecological sensitivity, visual impact, maintenance requirements, and project viability. The design for the PV ports is being developed by the architectural team with the intention of maximising area for solar PVs, while maintaining the architectural intent of the space. The strategy will continue to be refined during the subsequent design stages as the overall NZC_{OP} pathway is developed.

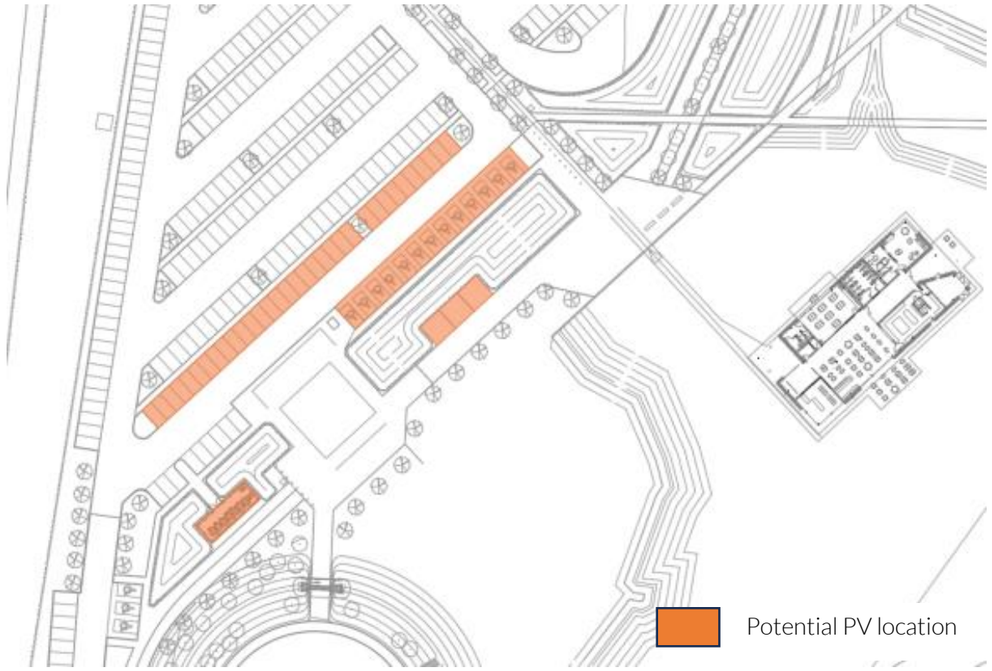


Figure 4-8 Proposed On-site Renewable strategy

Collectively, these installations provide approximately 558m^2 of suitable PV areas. The table below summarises the allocated area for PV installations at the various locations and their associated estimated generation.

Table 4-5 Potential Onsite generation

Area	Potential area for PVs (m^2)	Estimated generation (kWh/year)	
		Lower range value	Upper range value
Bins roof	46	7,361	9,201
Cycle shelter roof	53	8,485	10,606
Disabled parking (main)	193	30,872	38,590
Family parking (section 1)	185	29,631	37,038
Family parking (section 2)	80	12,868	16,085
Total Potential area for PVs	**558**	**89,216**	**111,520**

The proposed PV installations are estimated to generate between approximately 89 to 111MWh annually. This equates to about 21%-26% of the site's anticipated annual energy demand. The current on-site renewable energy strategy has been developed based on the preliminary operational energy estimates presented in Section 3.2.1 and will continue to be reviewed as the operational energy predictions are refined through the subsequent design stages.

The current strategy delivers onsite generation for only a proportion of the site's overall energy demand. The design has therefore been developed to allow future optimisation and expansion of the on-site renewable energy capacity as the design progresses. Prior to construction, the design team and Portsmouth Water will continue to investigate opportunities to increase the installed capacity, including the expansion of proposed solar PV provision where applicable, with the objective of achieving full or near full Operational Net Zero Carbon performance.

Further opportunities to maximise on-site renewable energy generation will continue to be explored as the design develops. This will include reviewing the potential to expand the proposed carport PV installations and identifying any additional suitable PV locations to further support the project's Operational Net Zero Carbon objective.

Offsite solutions are also being explored within Portsmouth Water's wider operational estate are currently being considered. This includes the proposed ground-mounted solar PV installation associated with the Bedhampton Pumping Station site, which may provide an opportunity to contribute towards meeting the residual operational energy demand associated with the development and support the project's Operational Net Zero Carbon objective.

At this stage, the final renewable energy strategy, associated generation capacity, and overall NZC_{OP} approach are still under development and will be refined during the subsequent design stages. The design team and Portsmouth Water will continue to review opportunities to maximise renewable energy generation before construction commences, taking into account operational requirements, ecological constraints, site viability, financial constraints, and the wider reservoir development programme.

4.4. Monitoring and Reporting Performance

The following element focuses on monitoring and reporting the building performance. Following the project brief of maximising public engagement on the project to create awareness around energy efficiency, several measures have been considered for this project.

The project intends to integrate a strategy for real-time energy monitoring, data sharing, and public education. To engage visitors and occupants, the Visitor Centre can consider incorporating dashboards in prominent areas of the building. These can serve as educational tools, showcasing how sustainable technologies are integrated and performing in real time. These would present live data on:

- Electricity and water consumption,
- Renewable energy generation (e.g., PV output),
- Heating and DHW energy usage,
- Associated environmental savings.

The details of the measure are to be developed in the later stages.

A comprehensive metering plan will be developed to support both internal building management and public transparency. The following parameters will be monitored:

- Electricity usage at the main supply and local distribution board levels,
- Cold and hot water usage, including DHW demand,
- Energy consumption for DHW systems,
- Heating system energy use,

- Renewable generation, measured via PV inverters.

This system will be integrated into an Automated or Building Management System (AMS/BMS), with consideration for cloud-based, IoT-enabled platforms. These solutions will allow real-time analytics, remote access, and the display of key performance metrics on the public dashboards mentioned above.

This collected data could also support a formal Post Occupancy Evaluation (POE), which is a tool to verify the performance of building, identify any operational gaps, and refine future design strategies. The exercise would also provide a hypothetical BREEAM credit.

The design also considers a visible plant room providing visual access to rainwater harvesting plant. This is to allow visitors to better understand on-site water reuse systems and their role in reducing environmental impact.

4.5. EV Strategy

The EV Charging Strategy for the development has been developed in line with the requirements of Part S of the Building Regulations, Policy IN3 (Transport and Parking) of the Havant Borough Local Plan, and relevant industry guidance including BG 86:2024 Electrical Criteria.

As a minimum, Part S requires the provision of at least one active EV charging point, passive provision through cable routes for at least one in every five remaining parking spaces, and sufficient spare electrical infrastructure capacity to facilitate future EV charger installation without significant disruption. In addition, Policy IN3 of the Havant Borough Local Plan requires a minimum of 20% of parking spaces to incorporate EV charging provision where vehicles are expected to be parked for significant periods of time.

The proposals include the installation of a combination of fast EV charging points across the scheme, as summarised in the table below.

Table 4-6 Proposed EV Strategy

Charge Point Type	Power Transfer	Typical Charging Time	No. of Units
Fast	<150kW Single Phase	1 to 3 hrs	1
Fast	<22kW Three Phase	1 to 2 hrs	20

The proposed 22 kW charging points are considered appropriate for the operational nature of the site due to their charging duration of approximately 1 to 2 hours, which aligns with anticipated visitor dwell times and short-stay usage patterns. The proposed 150 kW charging point would provide rapid charging capability where required and improve flexibility for future operational requirements.

In addition to the active charging provision, passive EV-ready infrastructure is proposed for one in every five remaining parking spaces. This includes:

- Cable routes from the distribution boards to the parking bays,
- Ducting sized to accommodate future EV cabling,
- Accessible connection points for future installation, and
- Spare capacity within the electrical infrastructure and distribution boards.

The strategy ensures compliance with both national and local planning policy, and best practice industry guidance such as - BG 86:2024 Electrical Criteria guidance while future-proofing the development to accommodate increased EV charging demand over time.

When additional EV charging points are installed in the future, electrical diversity factors may be applied to reduce the overall power demand associated with simultaneous charging. The extent of diversity will depend on operational usage patterns, user behaviour, and the implementation of smart charging systems.

Smart charging systems can assist in managing electrical demand by dynamically controlling charging rates and distributing available power across connected vehicles. This may include:

- Prioritising vehicles with lower states of charge, and
- Reducing charging rates during peak utility demand periods.

The details of the EV charging infrastructure will be developed further during the subsequent design stages.

4.6. External Lighting Strategy

The external lighting strategy for the development has been designed to balance operational and safety requirements with the need to minimise ecological impact and night-time light pollution. The strategy has been informed by the recommendations within the Ecologist Report, relevant BREEAM guidance, and the Society of Light and Lighting (SLL) guidance.

Given the sensitive ecological context of the site, particular consideration has been given to minimising disturbance to bats, birds, and other wildlife associated with the reservoir and surrounding habitats. The strategy therefore adopts a zonal lighting approach, with lighting provided only where functionally required and minimised within ecologically sensitive areas.

All external lighting will utilise low-UV LED luminaires with warm colour temperatures in the range of approximately 2200K to 3000K to reduce ecological disturbance. Lighting along the bridge and adjacent reservoir areas will specifically utilise warm lighting to minimise disruption to wildlife associated with the waterbody. No intentional lighting will be directed towards the lake, surrounding vegetation, or adjacent habitats.

Illuminance levels across the site will be maintained at the minimum levels required to ensure safe operation and accessibility. In accordance with the Ecologist recommendations, emergency lighting along the bridge escape route will provide approximately 1 lux along the route. The overall lighting design will seek to comply with the Environmental Zone E1 obtrusive light limits, with maximum vertical illuminance levels limited to approximately 2 lux pre-curfew and 1 lux post-curfew.

Lighting controls including photocells, PIR sensors, and timeclock controls shall be incorporated to ensure that external lighting operates only during defined operational periods and when required for safety or events. Functional lighting associated with event use will be restricted to designated zones only, reducing unnecessary illumination across the wider site.

All luminaires will be fully shielded and carefully positioned to minimise upward light spill. Consideration will be given to minimising spill towards non-functional areas such as trees, ecological corridors, and water edges. Brighter luminaires located beneath canopies will be recessed and shielded where possible to further reduce upward spill and sky glow.

In addition, lighting column heights will be minimised where possible to further reduce visual impact and light spill into surrounding ecological areas.

The external lighting strategy will continue to be developed during the subsequent design stages, including detailed lux level calculations, lighting layouts, zoning arrangements, and controls strategies.

4.7. Additional Sustainability Strategies.

The project includes the following sustainability strategies:

- Provision of dedicated storage facility for recycling of operational waste
- Introduction of native plant species with the intent of habitat creation. Details of these can be found in the landscape design.

5. Conclusion.

This Sustainability and Energy Statement demonstrates that the proposed Visitor Centre development at Havant Thicket Reservoir has been designed in line with the relevant national policy, local planning requirements, and Portsmouth Water's wider sustainability aspirations. The strategy adopts Havant's energy hierarchy, a fabric-first and low carbon design approach, informed by regulatory and best practice industry guidance.

The project targets NZC_{OP}, as agreed with the Local Planning Authority in place of a formal BREEAM assessment. The design has therefore been developed in accordance with the Havant energy hierarchy, first seeking to minimise operational energy demand through passive design measures before considering energy-efficient building services and renewable energy generation. Passive measures incorporated within the design include a high-performance building envelope, optimised building orientation, solar control, natural ventilation, daylight optimisation, airtight construction, and water efficiency measures. Together these strategies reduce the building's inherent energy demand and establish a robust foundation for achieving low operational carbon.

The project further proposes an all-electric building services strategy supported by heat pump technology, with the preferred heat pump solution currently under evaluation. The renewable energy strategy is also continuing to develop, with opportunities for both onsite renewable generation and complementary renewable energy provision within Portsmouth Water's wider operational estate being explored to support the project's NZC_{OP} objective. This approach provides flexibility as the design progresses while maintaining the commitment to delivering an Operational Net Zero Carbon development.

Overall, the proposed development establishes a clear and flexible framework for delivering a sustainable, energy-efficient, and environmentally responsive visitor facility. The strategy demonstrates that sustainability considerations have informed the design from the outset while allowing sufficient flexibility for further optimisation during the subsequent design stages without compromising the project's ambition of achieving Operational Net Zero Carbon.

6. Appendix

6.1. Appendix A – Key Definitions

The following definitions have been curated by RCDC.

6.1.1. Lifecycle carbon

Carbon emissions of a building should be considered for the full lifecycle of the building. The adjacent graph shows how these emissions are typically emitted for a modern building.

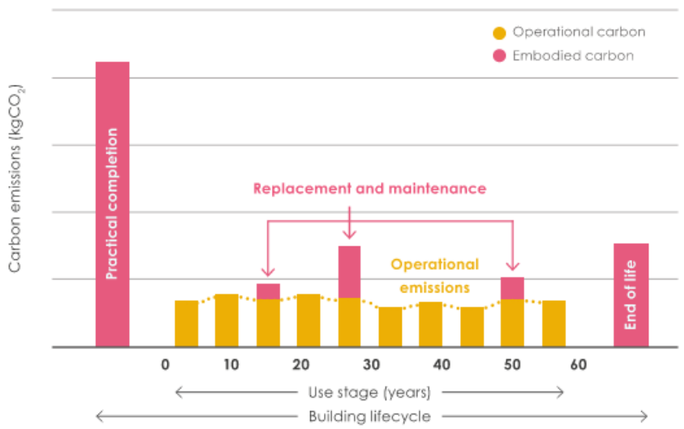


Figure 6-1. Diagram showing typical lifecycle carbon emissions. Graph courtesy of LETI

Emissions can be broadly split into two categories: Operational Carbon and Embodied Carbon. Operational carbon is the carbon associated with the energy use of the building, whilst embodied carbon is the carbon associated with the materials and processes used in construction, maintenance, and demolition. When considering Net Zero Carbon (NZC), it is useful to split the definitions of NZC into these two categories, to allow each of these to be specifically dealt with.

6.1.2. NZC Operational (NZC_{OP}) Definition

The following definition is suggested for NZC_{OP}, this is based on a collation of industry body definitions and a science-based approach.

> *Operational carbon emissions associated with energy and water usage of the building are targeted to be balanced by onsite renewable energy generation. Use of fossil fuels will be avoided due to their direct on-site carbon emissions and non-renewable nature. Minimum energy usage goals should be set through selection of carefully defined Energy Use Intensity (EUI) targets. Energy and carbon balance is to be targeted through maximisation of onsite renewable energy generation. Where the balance is not achieved due to technical limitations, the option to close the gap through use of carbon offsets is available.*

6.1.3. Achieving NZC

Achieving NZC_{OP} requires onsite energy generation to equal or exceed the anticipated operational energy usage. Operational energy predictions are based on high level energy usage predictions informed by the space types proposed. These high-level calculations are performed so far to inform the current proposals. TM54 calculations are to be carried out at a later stage to validate the predictions done at this stage.

Current proposals for on-site energy generation have been developed utilising PV energy prediction tools, and previous project experience. The tool helps to predicts the energy generation on the site considering the climate, neighbouring elements, and angles, orientation, and efficiency of the solar PVs. The predictions have been used to compare the predicted energy consumption and generation.